determining a time dependent coverage of the satellite constellation based on the orbit period and the trajectory of each of the desired satellites;

tilting the trajectory of at least one of the desired satellites to reorient the satellite constellation [without changing the relative configuration of the desired satellites within the satellite constellation] to obtain a second coverage based on the time dependent coverage, the second coverage providing maximum coverage at the predetermined local times for the set of predetermined geographic locations; and

generating command signals for modifying the trajectory of the at least one desired satellite based on the tilted trajectory.

10. (TWICE AMENDED) A system for maximizing satellite constellation coverage at predetermined local times for a set of predetermined geographic locations, the satellite constellation having a first coverage and including at least two desired satellites wherein each of the desired satellites have a trajectory associated therewith [and a relative configuration within the satellite constellation], the system comprising:

a processor operative to determine a period of orbit for each of the desired satellites, determine a time dependent coverage of the satellite constellation based on the orbit period and the trajectory of each of the desired satellites, and to tilt the trajectory of at least one of the desired satellites to reorient the satellite constellation [without changing the relative configuration of the desired satellites within the satellite constellation] to obtain a second coverage based on the time dependent coverage, the second coverage providing maximum coverage at the predetermined local times for the set of predetermined geographic locations; and

means for generating command signals for modifying the trajectory of the at least one desired satellite based on the tilted trajectory.

Remarks

Reconsideration and reexamination of this application, as amended, are respectfully requested.

Claims 1-19 are pending in this application. Claims 1 and 10 have been amended. No claims have been cancelled or added.

The Drawings

In the final Office Action mailed July 8, 1999, the Examiner disapproved the proposed drawing correction and/or the proposed substitute sheets of drawings, ("proposed revised FIG. 3"), filed on April 22, 1999. The Examiner posited that the proposed revised FIG. 3 introduced new matter into the drawings and that the original disclosure does not support the showing of boxes 24, 26, 28, and 30 of proposed revised FIG. 3. The Applicants respectfully disagree.

Boxes 20, 22, 24, 26, 28, and 30 of proposed revised FIG. 3 are generally supported on page 2, lines 6-28; and page 5, line 1, through page 9, line 22 in the specification. Specifically, box 20 "Determine Desired Satellite Constellation" is supported by page 5, lines 3-4, "a desired satellite constellation is determined, as shown at block 20."

Box 22 "Determine Period of Rotation of Each of the Desired Satellites" is supported by page 5, line 23-24, "the period of rotation of each of the satellites is determined, as shown at block 22."

Box 24 "Determine Time Dependent Coverage of Each of the Desired Satellites Based on the Period" is supported by page 7, lines 13-15, "Knowing the period of the satellite constellation, the time dependent coverage provided by the satellites can then be determined, as shown at block 24."

Box 26 "Tilt the Trajectory of at Least One of the Desired Satellites to Modify the Coverage Provided by the Constellation" is supported by page 8, lines 6-8, "This is achieved by tilting, or reorienting, the satellite constellation around the y axis in the equatorial plane, as shown at block 26." Page 2, lines 20-22 also provides support for box 26.

Box 28 "Launch the Desired Satellites with the Modified Trajectory" is supported by page 9, lines 10-12, "The satellites are then launched into space via the launch vehicle with the new orbital parameters programmed therein, as shown at block 28."

Box 30 "Generate Command Signals to Modify the Trajectory of the Desired Satellites" is supported by page 9, lines 13-16, "For existing satellite constellations, command signals must be generated by the satellite ground station 12 in order to achieve the desired amount of tilting, as shown at block 30."

As shown, boxes 20, 22, 24, 26, 28, and 30 of proposed revised FIG. 3 are supported in the specification. Accordingly, the Applicants request reconsideration and withdrawal of the disapproval by the Examiner of proposed revised FIG. 3.

The Amendment Filed April 22, 1999

The Examiner objected to the Amendment filed April 22, 1999, as introducing new matter into the disclosure. The Examiner posited that the added material which is not supported by the specification is as follows: 1) the limitation of orienting the satellite constellation without changing the relative configuration of the desired satellites within the satellite constellation, and 2) the limitation of generating command signals based on tilted trajectory.

With respect to the first limitation, the Applicants have amended claims 1 and 10 to remove the language regarding "relative configuration."

With respect to the second limitation, the Applicants respectfully disagree to the objection of the Examiner. Support for the limitation of generating command signals based on tilted trajectory is found on page 8, lines 24-26, "Finally, command signals are generated for modifying the trajectory based on the desired amount of tilting." The Applicants, therefore, request reconsideration and withdrawal of the objection to the Amendment filed April 22, 1999.

Claim Rejections Under 35 U.S.C. § 103

The Examiner rejected claims 1-19 under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 4,809,935 issued to Draim ("Draim") in view of U.S. Patent No. 4,776,540 issued to Westerlund ("Westerlund") or U.S. Patent No. 5,738,309 issued to Fowell ("Fowell").

The Examiner cited Draim as disclosing a satellite constellation covering a specific geographical area but being silent on tilting the trajectory to reorient the constellation to cover a second coverage. The Examiner cited Westerlund and Fowell as disclosing tilting satellites to "reorient" the satellite constellation to cover various geographical areas. The Examiner then posited that it would have been obvious to have tilted the trajectory of the satellite constellation of Draim as taught by either Westerlund or Fowell to maximize the coverage area of the desired geographical area.

The claimed invention provides a method and system for maximizing satellite constellation coverage at predetermined local times for a set of predetermined geographic locations. The satellite constellation coverage includes a first coverage and at least two desired satellites. Each of the desired satellites has a trajectory associated therewith. A period of orbit for each of the desired satellites is determined. A time dependent coverage of the satellite constellation is then determined based on the orbit period and the trajectory of each of the desired satellites.

As described on page 8, lines 1-11 of the specification, maximizing satellite constellation coverage depends on the local time at a predetermined geographical location. It is desirable to have the maximum number of satellites providing coverage at the predetermined geographical location during the middle of the day. This is achieved by tilting, or reorienting, the satellite constellation around the y axis in the equatorial plane. This process is accomplished by rotating the parameters defining the trajectory.

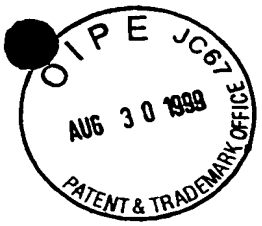
The claimed invention includes tilting the trajectory of at least one of the desired satellites to reorient the satellite constellation to obtain a second coverage based on the time dependent coverage. The second coverage provides maximum coverage at the predetermined local times for the set of predetermined geographical locations. Command signals for modifying the trajectory of the at least one the desired satellites are then generated based on the tilted trajectory.

Draim teaches a satellite constellation for continuous global coverage. Westerlund and Fowell teach tilting satellites per se. The claimed invention is not tilting a physical object, but rather is tilting the trajectory of the satellites to reorient the satellite constellation as a function of the time dependent coverage of the satellite constellation prior to tilting.

In view of the foregoing amendments and remarks, it is believed that claims 1-19 overcome the rejections under 35 U.S.C. § 103(a). Thus, the Applicants request reconsideration and withdrawal of the rejection to claims 1-19 under 35 U.S.C. § 103(a).

Conclusion

The Applicants have made a genuine effort to respond to each of the Examiner's objections and rejections in advancing the prosecution of this case. The Applicants believe that all formal and substantive requirements have been met and that this case is in condition for allowance, which action is respectfully requested.



If a telephone or video conference would expedite allowance or resolve any further questions, such a conference is invited at the convenience of the Examiner.

Respectfully submitted,

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